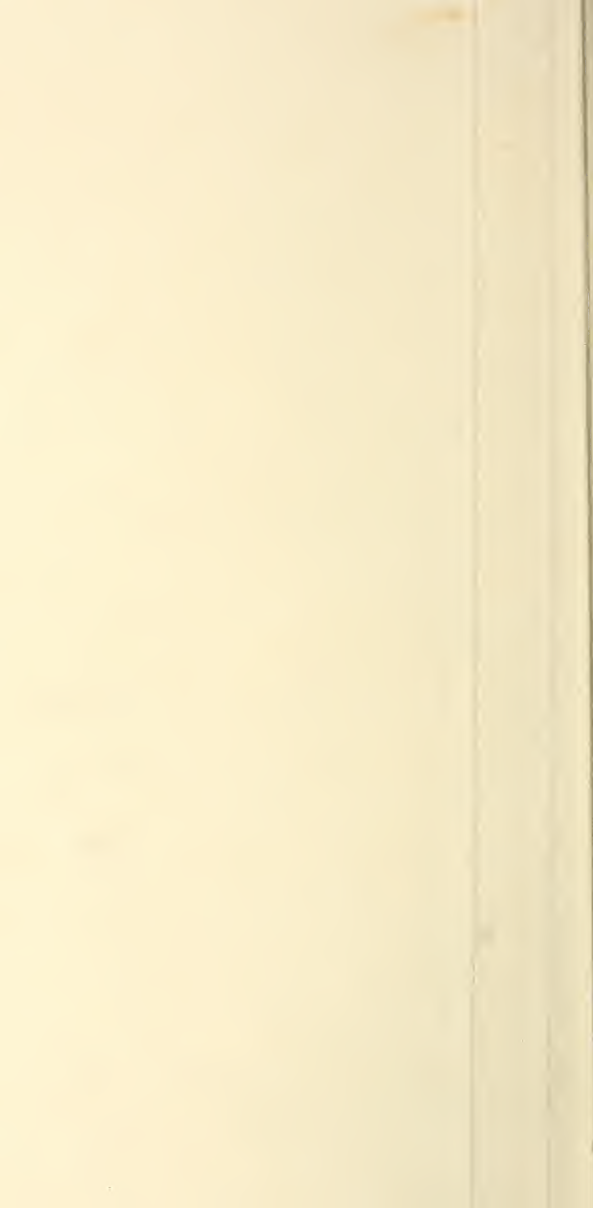


Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.



United States Department of Agriculture
Reserve Bureau of Markets
1 Charles J. Brand, Chief

M346H

HANDBOOK

OFFICIAL GRAIN
STANDARDS

for

WHEAT

and

SHELLED CORN

Tabulated and abridged description of the official grain standards of the United States for wheat and for shelled corn as established and promulgated by the Secretary of Agriculture, April 13, 1918, effective July 15, 1918, and a brief discussion of methods of grading thereunder.

Compiled by E. G. BOERNER, *Grain Supervisor, in charge Appeals and Inspection Procedure.*

[Compiled from Service and Regulatory Announcements (Markets) No. 33: Official Grain Standards of the United States for Wheat and Official Grain Standards of the United States for Shelled Corn.]

UNITED STATES
DEPARTMENT OF AGRICULTURE
LIBRARY



Reserve
BOOK NUMBER

1

M346H

845179

815179

CONTENTS

	PAGE
Wheat standards.....	2
Hard Red Spring wheat (Class I)....	2
Durum wheat (Class II).....	4
Hard Red Winter wheat (Class III)..	6
Soft Red Winter wheat (Class IV)...	8
Common White wheat (Class V).....	10
White Club wheat (Class VI).....	12
Definitions.....	13
Shelled corn standards.....	18
Classes of shelled corn.....	18
Definitions.....	20
The sampling of grain.....	22
Grain trier (probe) and sampling can-	
vas.....	24
Sampling device.....	26
Method of making moisture tests.....	28
Dockage in wheat.....	32
Equipment for separating dockage in	
wheat.....	32
Method of determining dockage in	
wheat.....	35
Test weight per bushel.....	38
Test weight to be determined on dock-	
age free wheat.....	38
Standard method of making the test..	38
Foreign material and cracked corn....	41
Apparatus for grading wheat and shelled	
corn according to the official grain	
standards.....	42
Appeals and disputes under the United	
States grain standards Act.....	45
Appeals.....	45
Disputes.....	46
Fees and charges.....	46
Secretary's findings.....	46
How to file an appeal or dispute.....	47

WHEAT STANDARDS

HARD RED SPRING WHEAT (CLASS I)

This class shall include all varieties of hard red spring wheat, and may include not more than 10 per centum of other wheat or wheats. This class shall be divided into three subclasses as follows:

SUBCLASS (a) DARK NORTHERN SPRING

This subclass shall include wheat of the class Hard Red Spring consisting of 75 per centum or more of dark, hard, and vitreous kernels. This subclass shall not include more than 10 per centum of wheat of the variety Humpback.

SUBCLASS (b) NORTHERN SPRING

This subclass shall include wheat of the class Hard Red Spring consisting of less than 75 per centum and more than 25 per centum of dark, hard, and vitreous kernels. This subclass shall not include more than 10 per centum of wheat of the variety Humpback.

SUBCLASS (c) RED SPRING

This subclass shall include wheat of the class Hard Red Spring consisting of not more than 25 per centum of dark, hard, and vitreous kernels. This subclass shall also include wheat of the class Hard Red Spring consisting of more than 10 per centum of the variety Humpback.

Class I. Hard Red Spring wheat.

Grade requirements for:

(a) *Dark Northern Spring*, (b) *Northern Spring*, (c) *Red Spring*.

Grade No.	Minimum test weight per bushel.	Maximum limits of—						
		Mois- ture.	Dam- aged kernels.		Foreign material other than dockage.		Wheats of other classes.	
			Total.	Heat damage.	Total.	Matter other than cereal grains.	Total.	Common White, White Club, and Durum, singly or combined.
	Lbs.	%	%	%	%	%	%	%
1.....	58	14.0	2	0.1	1	0.5	5	2
2.....	57	14.5	4	0.2	2	1.0	10	5
3.....	55	15.0	7	0.5	3	2.0	10	10
4.....	53	16.0	10	1.0	5	3.0	10	10
5.....	50	16.0	15	3.0	7	5.0	10	10
Sample ¹	..	....	..	..	..	...	..	..

¹*Sample Grade* shall be wheat of the subclass *Dark Northern Spring*, or *Northern Spring*, or *Red Spring*, respectively, which does not come within the requirements of any of the grades from No. 1 to No. 5, inclusive, or which has any commercially objectionable foreign odor except of smut, garlic, or wild onions, or is very sour, or is heating, hot, infested with live weevils or other insects injurious to stored grain, or is otherwise of distinctly low quality, or contains small, inseparable stones or cinders.

(1) The wheat in grade No. 1 shall be bright.

(2) The wheat in grades Nos. 1 to 4, inclusive, shall be cool and sweet.

(3) The wheat in grade No. 5 shall be cool, but may be musty or slightly sour.

(4) The wheat in grade No. 1 *Dark Northern Spring* and grade No. 1 *Northern Spring* may contain not more than 5 per centum of the hard red spring wheat variety *Humpback*.

DURUM WHEAT (CLASS II)

This class shall include all varieties of durum wheat, and may include not more than 10 per centum of other wheat or wheats. This class shall be divided into three subclasses as follows:

SUBCLASS (a) AMBER DURUM

This subclass shall include wheat of the class Durum consisting of 75 per centum or more of hard and vitreous kernels of amber color. This subclass shall not include more than 10 per centum of wheat of the variety Red Durum.

SUBCLASS (b) DURUM

This subclass shall include wheat of the class Durum consisting of less than 75 per centum of hard and vitreous kernels of amber color. This subclass shall not include more than 10 per centum of wheat of the variety Red Durum.

SUBCLASS (c) RED DURUM

This subclass shall include wheat of the class Durum consisting of more than 10 per centum of the variety Red Durum.

Class II. Durum wheat.

Grade requirements for:

(a) *Amber Durum*, (b) *Durum*, (c) *Red Durum*.

Grade No.	Minimum test weight per bushel.	Maximum limits of—						
		Mois- ture.	Dam- aged kernels.		Foreign material other than dockage.		Wheats of other classes.	
			Total.	Heat damage.	Total.	Matter other than cereal grains.	Total.	Soft Red Winter, Common White, and White Club, singly or combined
	<i>Lbs.</i>	%	%	%	%	%	%	%
1.....	60	14.0	2	0.1	1	0.5	5	2
2.....	58	14.5	4	0.2	2	1.0	10	5
3.....	56	15.0	7	0.5	3	2.0	10	10
4.....	54	16.0	10	1.0	5	3.0	10	10
5.....	51	16.0	15	3.0	7	5.0	10	10
Sample ¹	..	....	...	...	..	...	..	..

¹*Sample Grade* shall be wheat of the subclass *Amber Durum*, or *Durum*, or *Red Durum*, respectively, which does not come within the requirements of any of the grades from No. 1 to No. 5, inclusive, or which has any commercially objectionable foreign odor except of smut, garlic, or wild onions, or is very sour, or is heating, hot, infested with live weevils or other insects injurious to stored grain, or is otherwise of distinctly low quality, or contains small, inseparable stones or cinders.

(1) The wheat in grade No. 1 shall be bright.

(2) The wheat in grades Nos. 1 to 4, inclusive, shall be cool and sweet.

(3) The wheat in grade No. 5 shall be cool, but may be musty or slightly sour.

(4) The wheat in grade No. 1 *Amber Durum* and grade No. 1 *Durum* may contain not more than 5 per centum of wheat of the variety *Red Durum*.

HARD RED WINTER WHEAT (CLASS III)

This class shall include all varieties of hard red winter wheat, and may include not more than 10 per centum of other wheat or wheats. This class shall be divided into three subclasses as follows:

SUBCLASS (a) DARK HARD WINTER

This subclass shall include wheat of the class Hard Red Winter consisting of 80 per centum or more of dark, hard, and vitreous kernels.

SUBCLASS (b) HARD WINTER

This subclass shall include wheat of the class Hard Red Winter consisting of less than 80 per centum and more than 25 per centum of dark, hard, and vitreous kernels.

SUBCLASS (c) YELLOW HARD WINTER

This subclass shall include wheat of the class Hard Red Winter consisting of not more than 25 per centum of dark, hard, and vitreous kernels.

Class III. Hard Red Winter wheat.

Grade requirements for:

- (a) *Dark Hard Winter*, (b) *Hard Winter*,
(c) *Yellow Hard Winter*.

Grade No.	Minimum test weight per bushel.	Maximum limits of—						
		Mois- ture.	Dam- aged kernels.		Foreign material other than dockage.		Wheats of other classes.	
			Total.	Heat damage.	Total.	Matter other than cereal grains.	Total.	Common White, White Club, and Durum, singly or combined.
	Lbs.	%	%	%	%	%	%	%
1.....	60	13.5	2	0.1	1	0.5	5	2
2.....	58	14.0	4	0.2	2	1.0	10	5
3.....	56	14.5	7	0.5	3	2.0	10	10
4.....	54	15.5	10	1.0	5	3.0	10	10
5.....	51	15.5	15	3.0	7	5.0	10	10
Sample ¹	..	...	..	.	.	...	..	..

¹*Sample Grade* shall be wheat of the subclass *Dark Hard Winter*, or *Hard Winter*, or *Yellow Hard Winter*, respectively, which does not come within the requirements of any of the grades from No. 1 to No. 5, inclusive, or which has any commercially objectionable foreign odor except of smut, garlic, or wild onions, or is very sour, or is heating, hot, infested with live weevils or other insects injurious to stored grain, or is otherwise of distinctly low quality, or contains small, inseparable stones or cinders.

(1) The wheat in grade No. 1 shall be bright.

(2) The wheat in grades Nos. 1 to 4, inclusive, shall be cool and sweet.

(3) The wheat in grade No. 5 shall be cool, but may be musty or slightly sour.

SOFT RED WINTER WHEAT (CLASS IV)

This class shall include all varieties of soft red winter wheat, also red club and red hybrid wheats of the Pacific Northwest, and may include not more than 10 per centum of other wheat or wheats. This class shall be divided into two subclasses as follows:

SUBCLASS (a) RED WINTER

This subclass shall include wheat of the class Soft Red Winter, consisting of both light and dark colored kernels. This subclass shall not include more than 10 per centum, either singly or in any combination, of Red Russian, red clubs, red hybrids, and other soft red winter wheats possessing the characteristics of those varieties as grown west of the Great Plains area of the United States.

SUBCLASS (b) RED WALLA

This subclass shall include wheat of the class Soft Red Winter consisting of more than 10 per centum, either singly or in any combination, of Red Russian, red clubs, red hybrids, and other soft red winter wheats possessing the characteristics of those varieties as grown west of the Great Plains area of the United States.

Class IV. Soft Red Winter wheat.

Grade requirements for:

(a) *Red Winter*, (b) *Red Walla*.

Grade No.	Minimum test weight per bushel.		Maximum limits of—						
			Mois- ture.	Dam- aged kernels.		Foreign material other than dockage.		Wheats of other classes.	
	Red Winter.	Red Walla.		Total.	Heat damage.	Total.	Matter other than cereal grains.	Total.	Durum.
	Lbs.	Lbs.	%	%	%	%	%	%	%
1.....	60	58	13.5	2	0.1	1	0.5	5	2
2.....	58	56	14.0	4	0.2	2	1.0	10	3
3.....	56	54	14.5	7	0.5	3	2.0	10	10
4.....	54	52	15.5	10	1.0	5	3.0	10	10
5.....	51	49	15.5	15	3.0	7	5.0	10	10
Sample ¹	..	..	....	..	...	..	...	..	..

¹*Sample Grade* shall be wheat of the subclass Red Winter or Red Walla, respectively, which does not come within the requirements of any of the grades from No. 1 to No. 5, inclusive, or which has any commercially objectionable foreign odor except of smut, garlic, or wild onions, or is very sour, or is heating, hot, infested with live weevils or other insects injurious to stored grain, or is otherwise of distinctly low quality, or contains small, inseparable stones or cinders.

(1) The wheat in grade No. 1 shall be bright.

(2) The wheat in grades Nos. 1 to 4, inclusive, shall be cool and sweet.

(3) The wheat in grade No. 5 shall be cool, but may be musty or slightly sour.

COMMON WHITE WHEAT (CLASS V)

This class shall include all varieties, except Sonora, of common white wheat, whether winter or spring grown, and may include not more than 10 per centum of other wheat or wheats. This class shall be divided into two subclasses as follows:

SUBCLASS (a) HARD WHITE

This subclass shall include wheat of the class Common White consisting of 75 per centum or more of hard (not soft and chalky) kernels.

SUBCLASS (b) SOFT WHITE

This subclass shall include wheat of the class Common White consisting of less than 75 per centum of hard (not soft and chalky) kernels.

Class V. Common White wheat.

Grade requirements for:

(a) *Hard White*, (b) *Soft White*.

Grade No.	Minimum test weight per bushel.	Maximum limits of—						
		Mois- ture.	Dam- aged kernels.		Foreign material other than dockage.		Wheats of other classes.	
			Total.	Heat damage.	Total.	Matter other than cereal grains.	Total.	Durum.
	Lbs.	%	%	%	%	%	%	%
1.....	60	13.5	2	0.1	1	0.5	5	2
2.....	53	14.0	4	0.2	2	1.0	10	3
3.....	56	14.5	7	0.5	3	2.0	10	10
4.....	54	15.5	10	1.0	5	3.0	10	10
5.....	51	15.5	15	3.0	7	5.0	10	10
Sample ¹	..	....	..	...	..	...	..	..

¹*Sample Grade* shall be wheat of the subclass Hard White or Soft White, respectively, which does not come within the requirements of any of the grades from No. 1 to No. 5, inclusive, or which has any commercially objectionable foreign odor except of smut, garlic, or wild onions, or is very sour, or is heating, hot, infested with live weevils or other insects injurious to stored grain, or is otherwise of distinctly low quality, or contains small, inseparable stones or cinders.

(1) The wheat in grade No. 1 shall be bright.

(2) The wheat in grades Nos. 1 to 4, inclusive, shall be cool and sweet.

(3) The wheat in grade No. 5 shall be cool, but may be musty or slightly sour.

WHITE CLUB WHEAT (CLASS VI)

This class shall include all varieties and hybrids of white club wheat, and the common white wheat known as Sonora, and may include not more than 10 per centum of other wheat or wheats.

Class VI. White Club wheat.

Grade requirements for:

Grade No.	Minimum test weight per bushel.	Maximum limits of—						
		Mois- ture.	Dam- aged kernels.		Foreign material other than dockage.		Wheats of other classes.	
			Total.	Heat damage.	Total.	Matter other than cereal grains.	Total.	Durum.
	Lbs.	%	%	%	%	%	%	%
1.....	60	13.5	2	0.1	1	0.5	5	2
2.....	58	14.0	4	0.2	2	1.0	10	3
3.....	56	14.5	7	0.5	3	2.0	10	10
4.....	54	15.5	10	1.0	5	3.0	10	10
5.....	51	15.5	15	3.0	7	5.0	10	10
Sample ¹	..	....	..	...	..	...	..	..

¹*Sample Grade* shall be wheat of the class White Club which does not come within the requirements of any of the grades from No. 1 to No. 5, inclusive, or which has any commercially objectionable foreign odor except of smut, garlic, or wild onions, or is very sour, or is heating, hot, infested with live weevils or other insects injurious to stored grain, or is otherwise of distinctly low quality, or contains small, inseparable stones or cinders.

(1) The wheat in grade No. 1 shall be bright.

(2) The wheat in grades Nos. 1 to 4, inclusive, shall be cool and sweet.

(3) The wheat in grade No. 5 shall be cool, but may be musty or slightly sour.

DEFINITIONS

For the purposes of the official grain standards of the United States for wheat:

Wheat. Any grain which, when free from dockage, contains more than 10 per centum of grain of a kind or kinds other than wheat shall not be classified as wheat. The term "wheat" in these standards shall not include emmer, spelt, and einkorn.

Basis of determinations. Each determination of dockage, moisture, temperature, odor, onions, garlic, and live weevils or other insects injurious to stored grain shall be upon the basis of the grain including dockage. All other determinations shall be upon the basis of the grain when free from dockage.

Percentages. Percentages, except in the case of moisture, shall be percentages ascertained by weight.

Percentage of moisture. Percentage of moisture in wheat shall be that ascertained by the moisture tester and the method of use thereof described in Circular No. 72, and supplement thereto, issued by the United States Department of Agriculture, Bureau of Plant Industry, or ascertained by any device and method giving equivalent results.

Test weight per bushel. Test weight per bushel shall be the weight per Winchester bushel as determined by the testing apparatus and the method of use thereof described in Bulletin No. 472, dated October 30, 1916, issued by the United States Department of Agriculture, or as determined by any device and method giving equivalent results.

Dockage. Dockage includes sand, dirt, weed seeds, weed stems, chaff, straw, grain other than wheat, and any other foreign material, which can be removed readily from the wheat by the use of appropriate sieves, cleaning devices, or other practical means suited to separate the foreign material present; also undeveloped, shriveled, and small pieces of wheat kernels removed in properly separating the foreign material, and which cannot be recovered by properly rescreening or recleaning. The quantity of dockage shall be calculated in terms of percentage based on the total weight of the grain including the dockage. The percentage of dockage so calculated, when equal to one per centum or more, shall be stated in terms of whole per centum; and when less than one per centum shall not be stated. A fraction of a per centum shall be disregarded. The percentage of dockage, so determined and stated, shall be added to the grade designation.

Foreign material other than dockage. Foreign material other than dockage shall include all matter other than wheat which is not separated from the wheat in the proper determination of dockage, except as provided in the case of smutty wheat.

Cereal grains. Cereal grains shall include rye, barley, emmer, spelt, einkorn, corn, grain sorghums, oats, and rice, only, and shall not include buckwheat, flaxseed, and wild oats.

Heat-damaged kernels. Heat-damaged kernels shall be kernels and pieces of kernels of wheat which have been distinctly discolored by external heat or as a result of heating caused by fermentation.

Treated wheat. Treated wheat shall be wheat of which more than 10 per centum has been scoured, limed, washed, or treated in any similar manner.

Garlicky wheat. Garlicky wheat shall be all wheat which has an unmistakable odor of garlic or wild onions or which contains garlic or wild onion bulblets in a quantity equal to one or more bulblets in 1,000 grams of wheat.

Smutty wheat. Smutty wheat shall be all wheat which has an unmistakable odor of smut, or which contains spores, balls or portions of balls of smut in excess of a quantity equal to two balls of average size in 50 grams of wheat.

Mixed wheat. Mixed wheat shall be any mixture of wheat not provided for in the classes from I to VI, inclusive.

Grades for Mixed wheat. Mixed wheat shall be graded according to each of the grade requirements common to all of the subclasses of the class of the wheat which predominates over each other class in the mixture, except that (1) all of the grade requirements in any subclass as to the maximum percentage of other wheat or other varieties of wheat shall be disregarded, and (2) when soft red winter wheat so predominates, the grade requirements as to the test weight per bushel shall be those of the subclass Red Winter. The grade designation of mixed wheat shall include, successively, in the order named, the number of the grade or the words "Sample Grade," as the case may be, the word "Mixed," and, in the order of its predominance, the name and

approximate percentage of each class of wheat which constitutes 10 per centum or more of the mixture, but if only one class exceeds 10 per centum of the mixture, the name and approximate percentage of that class shall be added to the grade designation followed by the name and approximate percentage of at least one other class.

Grades for Treated wheat. Treated wheat shall be graded and designated according to the grade requirements of the standard applicable to such wheat if it were not treated, and there shall be added to, and made a part of, its grade designation a statement indicating the kind of treatment.

Grades for Garlicky wheat. Garlicky wheat shall be graded and designated according to the grade requirements of the standard applicable to such wheat if it were not garlicky, and there shall be added to, and made a part of, its grade designation the word "Garlicky."

Grades for Smutty wheat. Smutty wheat shall be graded and designated according to the method described either in paragraph (a) or paragraph (b) of this section.

(a) Before the determination of smut dockage as provided in this paragraph, the wheat shall be graded and designated according to the grade requirements of the standard applicable to such wheat if it were not smutty, except that smut balls shall not be considered as foreign material other than dockage. The loss in weight caused by the removal of smut from the wheat shall be ascertained by scouring, washing, or otherwise, and shall be calculated in terms of percentage

based on the total weight of the grain free from dockage. The percentage so calculated shall be stated in terms of whole per centum and half per centum. A fraction of a per centum when equal to, or greater than, a half shall be treated as a half, and when less than a half shall be disregarded. The percentage of the "smut dockage," so calculated and stated, shall be added to the grade designation preceding the statement of dockage, if any.

(b) Smutty wheat shall be graded and designated according to the grade requirements of the standard applicable to such wheat if it were not smutty, except that (1) smut balls shall not be considered as foreign material other than dockage, and (2) when the amount of smut present is so great that any one or more of the grade requirements of the grades from No. 1 to No. 5, inclusive, cannot be applied accurately, the wheat shall be classified as Sample Grade. For all grades there shall be added to and made a part of the grade designation, preceding the statement of dockage, if any, the word "Smutty."

SHELLED CORN STANDARDS

CLASSES OF SHELLED CORN

Shelled corn shall be divided into three classes, as follows:

WHITE CORN

This class shall consist of corn of which at least 98 per centum by weight of the kernels are white. A slight tinge of light straw color or of pink on kernels of corn otherwise white shall not affect their classification as white corn.

YELLOW CORN

This class shall consist of corn of which at least 95 per centum by weight of the kernels are yellow. A slight tinge of red on kernels of corn otherwise yellow shall not affect their classification as yellow corn.

MIXED CORN

This class shall consist of corn of various colors not coming within the limits for color as provided in the definitions of white corn and yellow corn. White-capped yellow kernels shall be classified as mixed corn.

Shelled corn.

Grade requirements for White, Yellow and Mixed corn:

Grade No.	Minimum test weight per bushel.	Maximum limits of—			
		Moisture.	Foreign material and cracked corn.	Damaged corn.	
				Total.	Heat damage.
	<i>Lbs.</i>	<i>%</i>	<i>%</i>	<i>%</i>	<i>%</i>
1... ..	55	14.0	2	2	.0
2.....	53	15.5	3	4	0.1
3.....	51	17.5	4	6	0.3
4.....	49	19.5	5	8	0.5
5.....	47	21.5	6	10	1.0
6.....	44	23.0	7	15	3.0
Sample ¹	..	....	.	..	...

¹*Sample grade* shall be White corn, or Yellow corn, or Mixed corn, respectively, which does not come within the requirements of any of the grades from No. 1 to No. 6, inclusive, or which has any commercially objectionable foreign odor, or is heating, hot, infested with live weevils or other insects injurious to stored grain, or is otherwise of distinctly low quality.

(1) The corn in grades Nos. 1 to 5, inclusive, shall be cool and sweet.

(2) The corn in grade No. 6 shall be cool, but may be musty or sour.

DEFINITIONS

For the purposes of the official grain standards of the United States for shelled corn (maize):

Corn. Corn shall be shelled corn of the flint or dent varieties.

Basis of determinations. Each determination of color, damage, and heat damage shall be upon the basis of the grain after the removal of foreign material and cracked corn as provided in the section defining foreign material and cracked corn. All other determinations shall be upon the basis of the grain including such foreign material and cracked corn.

Percentages. Percentages, except in the case of moisture, shall be percentages ascertained by weight.

Percentage of moisture. Percentage of moisture in corn shall be that ascertained by the moisture tester and the method of use thereof described in Circular No. 72, and supplement thereto, issued by the United States Department of Agriculture, Bureau of Plant Industry, or ascertained by any device and method giving equivalent results.

Test weight per bushel. Test weight per bushel shall be the weight per Winchester bushel as determined by the testing apparatus and the method of use thereof described in Bulletin No. 472, dated October 30, 1916, issued by the United States Department of Agriculture, or as determined by any device and method giving equivalent results.

Foreign material and cracked corn. Foreign material and cracked corn shall be kernels and pieces of kernels of corn, and all matter other than corn, which will pass through a metal sieve perforated with round holes fourteen sixty-fourths of an inch in diameter, and all matter other than corn remaining on such sieve after screening.

Heat-damaged kernels. Heat-damaged kernels shall be kernels and pieces of kernels of corn which have been distinctly discolored by external heat or as a result of heating caused by fermentation.

THE SAMPLING OF GRAIN

The obtaining of a representative sample is essential to the determination of the true grade of a given lot of grain. If the sample obtained is not representative, no amount of care in making determinations for the grading factors will establish the true grade of the grain sampled, consequently, great care should be taken in sampling, in order that the sample on which the grade of the grain is to be based shall truly represent the grain sampled.

The following instructions for sampling are contained in regulation 5 of the regulations of the Secretary of Agriculture under the United States grain standards Act (Circular No. 70, Office of the Secretary, United States Department of Agriculture).

Sec. 7. For the purposes of an appeal or a dispute no sample shall be deemed to be representative unless it comply with the following requirements:

Paragraph 1. It shall be at least two quarts in size, of which at least one and one-eighth pints shall be inclosed in a clean air-tight container and the remainder, if any, in a clean cloth sack.

Paragraph 2. In case of bulk grain in a carload lot or in a wagon, at least five probes, and as many more as may be necessary, in the discretion of the sampler, shall be taken from the grain in different parts of the car or wagon, as the case may be.

Paragraph 3. In case of bulk grain in a canal boat, barge, ship, or other vessel, at least five probes, and as many more as may be necessary, in the discretion of the sampler, shall be taken from the grain at differ-

ent points through each hatch or opening in the deck, except that, when it is impractical to obtain a sample in accordance with the foregoing portion of this paragraph, it may be drawn from the grain stream while running from the spout or on the belt or other conveyor to or from the vessel if taken in such a way as to show an average of the entire lot.

Paragraph 4. In case of grain in sacks, samples shall be drawn from such number of sacks selected at random from the entire lot as will, in the judgment of the sampler, show an average of the lot, except that, if the grade of each individual sack be in question, a sample shall be drawn from each sack.

Paragraph 5. In case of grain in an elevator or warehouse, or in any other case not covered in this section, samples shall be taken from as many different portions of the lot or parcel as will, in the judgment of the sampler, show an average of the lot or parcel.

Paragraph 6. The grain taken from the different portions of a lot or parcel shall be thoroughly mixed, and such mixture, or a typical portion thereof, otherwise complying with this regulation, shall constitute a sample of the entire lot or parcel.

Paragraph 7. In case any portion of a lot or parcel of grain is sour, musty, excessively wet, heating, hot, fire burnt, infested with live weevils or other insects injurious to stored grain, or otherwise of distinctly low quality, separate samples otherwise complying with this regulation shall be taken respectively, from such portion and from the remaining portion. There shall be filed with such samples a statement showing the estimated quantity of each portion of the grain from which each such sample was taken.

Paragraph 8. In case it shall appear that a lot or parcel of grain has been so loaded

or handled as intentionally to conceal evidently inferior grain, a sample of such inferior grain, otherwise complying with this regulation, shall constitute a sample of the entire lot or parcel.

GRAIN TRIER (PROBE) AND SAMPLING CANVAS

For obtaining a representative sample from bulk grain the use of the double tube, separate compartment grain trier (probe) shown in figure 1 is recommended.

The use of such a trier makes it possible for the sampler to note any unevenness in loading and also to ascertain the approximate location and quantity of any mixture of grain, or of dirty, smutty, heating, or damp spots, etc., found in any part of the grain. In order to assist in doing this it is advisable to use a canvas 5 feet by 2 feet in dimensions on which to empty the grain from the trier. The grain should be emptied lengthwise on the canvas, each separate trierful apart from the others, so that the grain from each compartment can be noted separately.

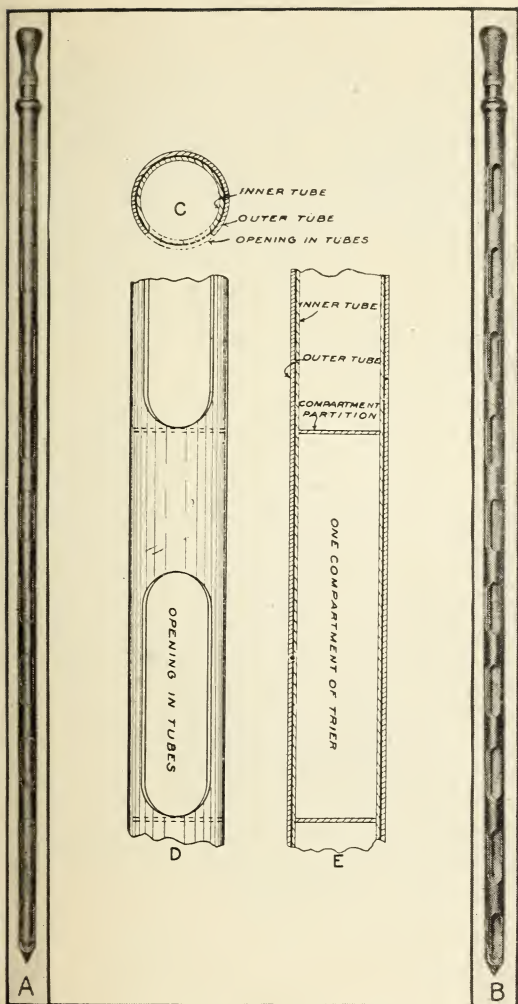


FIG. 1.—Grain trier (probe). Double-tubed, separate-compartment grain trier (probe), recommended by the Department of Agriculture. A, trier closed; B, trier open; C, cross section showing double tubes; D, sectional view; and E, longitudinal view showing compartments.

SAMPLING DEVICE

After a representative sample of the lot or parcel of grain to be graded is obtained, it is usually necessary to reduce its size considerably, in order that the grade may be determined by careful analysis. To reduce the size of a sample of grain containing foreign substances of different specific gravity or size than of the grain with which they are mixed, and at the same time obtain a sample as representative as the original, is hardly possible except by mechanical means.

Figure 2 illustrates a device which will divide a sample into smaller portions and still maintain the proper proportions for the various factors of the original sample. In the operation of this device the grain is placed in a hopper at the top of the machine and released, when it passes through an opening at the bottom of the hopper, down the sides of a cone, the point of which is directly under the center of the opening. Around the base of the cone are 36 pockets or openings. The grain falling down the sides of the cone is cut into 36 separate streams, which, a little further on, merge into two streams. Streams Nos. 1, 3, 5, 7, etc., and Nos. 2, 4, 6, 8, etc., unite forming two separate streams and empty into separate receptacles.

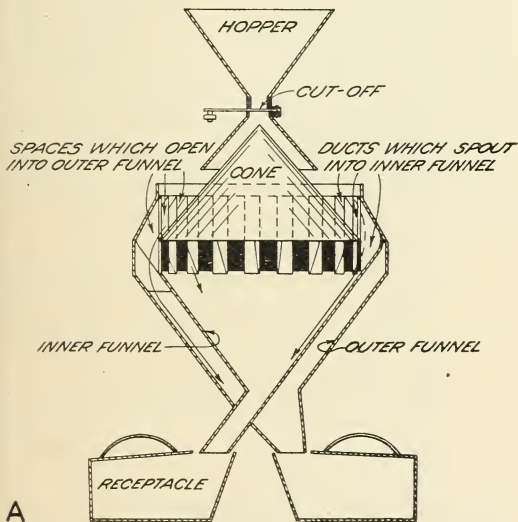
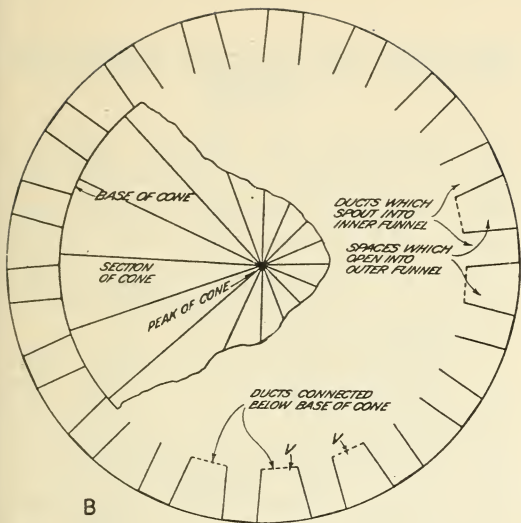


FIG. 2.—Sampling device. A, vertical cross section of device, showing the paths taken by the material in passing from the hopper to the containers; B, cross section of the device at the base of the cone.

METHOD OF MAKING MOISTURE TESTS

In determining the moisture content of grain, it is desirable that all important samples be tested in duplicate whenever practicable and the final result based on the average of the two tests. Results of tests need not be expressed more closely than one-tenth of one per cent.

Owing to the numerous methods of making moisture determinations and the wide variations in the results obtained by the different methods, the tester and method described in Circular No. 72 of the Bureau of Plant Industry, United States Department of Agriculture, have been designated as the standard on which the grades are based. This in no way precludes the use of other methods of making moisture determinations, so long as the results are corrected to conform to those secured by the standard method specified. Figure 3 represents a sectional view of the official standard moisture tester.

In making moisture tests of

Wheat: Use 100 grams of grain and 150 cubic centimeters of oil, and extinguish the flame when the thermometer registers 180° C.

Corn: Use 100 grams of grain and 150 cubic centimeters of oil, and extinguish the flame when the thermometer registers 190° C.

Special points for consideration:

(1) The moisture tester should be in-

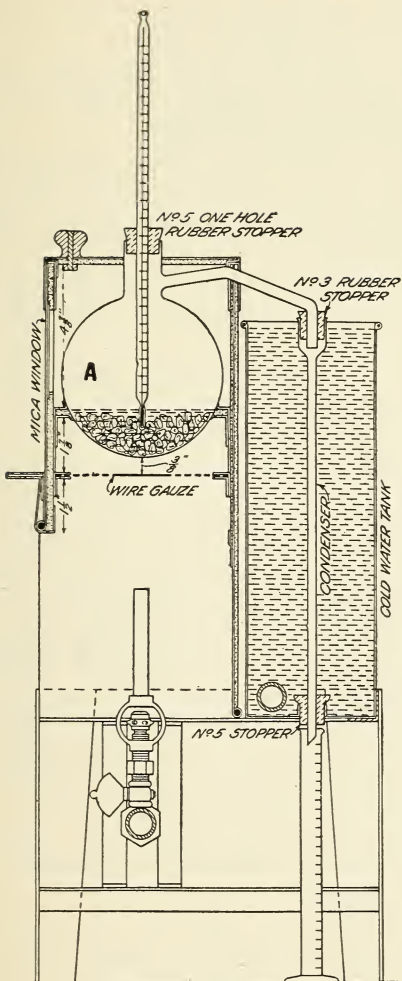


FIG. 3.—Moisture tester. Sectional view of the official moisture tester, showing the various parts properly connected for use. **A**, distillation flask in position, three-eighths of an inch above the wire gauze.

stalled in a place where it will not be exposed to strong air currents.

(2) The tester can be equipped for burning alcohol or gasoline, but gas is to be preferred whenever available.

(3) The wire gauze with asbestos center should be kept in good condition so that the flame will not play directly upon the bottom of the flask.

(4) The bottom of the flask should be not less than three-eighths of an inch above the wire gauze.

(5) See that the column of mercury in the thermometer is continuous; if broken it should be shaken down.

(6) Adjust the thermometers in the rubber stoppers so that the bulbs of the thermometers will be approximately four-fifths immersed in the oil.

(7) Keep a good supply of cold water running through the condenser tank.

(8) Adjust the flame so that about 20 minutes are required to reach the prescribed temperature.

(9) If the moisture content of the sample is high, so that there is a tendency to boil over, lower the flame until a considerable portion of the water is distilled over.

(10) When the thermometer registers the prescribed temperature, extinguish the flame promptly.

(11) After the flame is extinguished a slight gradual increase in temperature is to be expected. A sudden increase or a sudden decrease in temperature of several degrees indicates that the flame was too in-

tense during the latter part of the heating and the test should be repeated.

(12) See that there is no water in the graduated cylinder before starting the test.

(13) Read the percentage of moisture in the graduated cylinder beneath the layer of oil on top of the water.

(14) If the water which distills over is discolored, the substance has evidently been burned and the test should be repeated.

(15) When not in use keep the flasks in position in the compartments, with all connections made as for making a test.

(16) Before making a test in a new flask, "run" a preliminary sample, so that all the flasks will be in uniform condition.

(17) Draw all samples carefully and keep them in air-tight containers until ready to make the test. They lose moisture rapidly when exposed to the air.

(18) Place the scales on a firm support and see that they are in balance before making a weighing.

(19) The specific instructions for making tests given in Bureau of Plant Industry Circular No. 72 do not apply to modified forms of testers.

DOCKAGE IN WHEAT

EQUIPMENT FOR SEPARATING DOCKAGE IN WHEAT

In determining the quantity of dockage in connection with the official grading of wheat the following cleaning devices are used in the offices of Federal Grain Supervision:

1. A small wheat tester or device for removing barley, oats, wild oats, pieces of straw, weed stems, and other coarse matter from wheat. This is a modified form of the machine already in general use in the spring-wheat belt, where the dockage system has been practiced for many years. On account of the peculiar short, jerky motion of the riddle, this machine has been popularly designated as the "wild-oat kicker."

2. Set of perforated metal hand sieves. The sieves and bottom pan should be circular in shape and made of aluminum, brass, or other suitable material. The smooth surface of the metal should face up. The metal should be 0.025 to 0.035 inch in thickness:

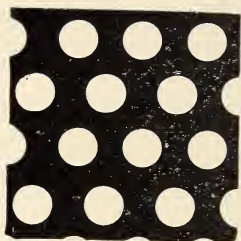
(a) Bottom pan: Inside diameter should be thirteen and one-eighth inches; depth two and one-half inches; and roll at top of pan three-sixteenths inch in diameter.

(b) Buckwheat sieve: With triangular perforations $\frac{3}{64}$ inch on each side of perforations; inside diameter of sieve should be thirteen inches; depth of sieve two inches and roll at top of sieve should be one-fourth inch in diameter.

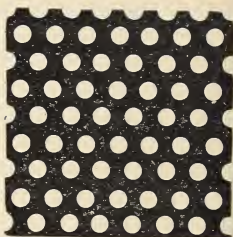
- (c) Fine seed sieve: With round perforations $\frac{1}{12}$ inch in diameter. (Other specifications and dimensions same as for (b) buckwheat sieve above.)
- (d) Fine chess sieve: With slotted perforations 0.064 inch wide and $\frac{3}{8}$ inch long. (Other specifications and dimensions same as for (b) buckwheat sieve above.)
- (e) Coarse chess sieve: With slotted perforations 0.070 inch wide by $\frac{1}{2}$ inch long. (Other specifications and dimensions same as for (b) buckwheat sieve above.)
- (f) Scalper sieve: With round perforations $\frac{12}{64}$ inch in diameter; depth of sieve should be one and one-half inches; inside diameter should be twelve and seven eighths inches and roll at top of sieve five-sixteenths inch in diameter.

Note.—Sieves (b), (c), (d), and (e) should be made to nest very freely with the bottom pan. The scalper sieve (f) should nest very freely with each of the other three sieves and also with the bottom pan.

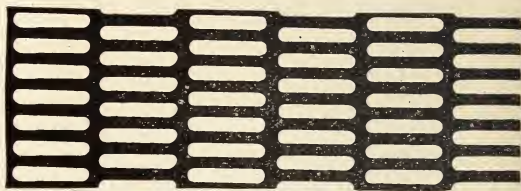
It is absolutely essential that the dimensions of the perforations of the sieves used be exactly as stated above. A slight variation in the dimensions materially influences the percentage of dockage obtained. In order to secure the exact size it is necessary that the perforations be cut with dies especially made for the purpose. Sieves made from tin or galvanized iron with an ordinary punch will not give accurate results.



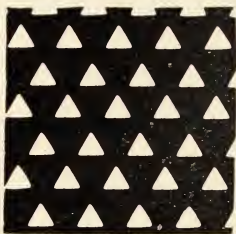
SCALPER SIEVE



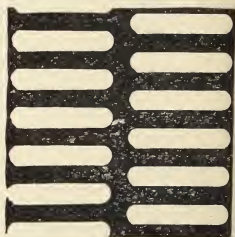
FINE SEED SIEVE



FINE CHESS SIEVE



BUCKWHEAT SIEVE



COARSE CHESS SIEVE

FIG. 4.—Illustrating the perforations (full size) of the dockage sieves adopted by the United States department of Agriculture, in connection with the enforcement of the United States grain standards Act. Buckwheat sieve, triangular perforations $\frac{8}{64}$ inch long on each side of perforation; scalper sieve, round perforations $\frac{12}{64}$ in diameter; fine chess sieve, slotted perforations 0.064 inch wide by $\frac{3}{8}$ inch long; coarse chess sieve, slotted perforations 0.07 inch wide by $\frac{1}{2}$ inch long; fine seed sieve, round perforations $\frac{1}{12}$ inch in diameter.

The shape and arrangement of the perforations are illustrated in figure 4, and the shape and manner of nesting of the sieves are shown in figure 5.

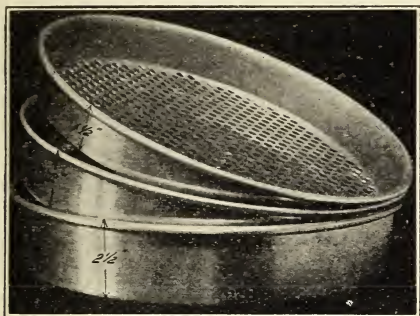


FIG. 5.—Nest of two dockage sieves and bottom pan.

From experiments in hand-screening and cleaning various kinds of foreign matter from wheat it has been found that with proper care the metal sieves with perforations as indicated for hand sieves, used in connection with the wild oat separator, will give a practical determination of dockage.

METHOD OF DETERMINING DOCKAGE IN WHEAT

In determining dockage such sieve or sieves should be used as will remove the foreign material with the least possible loss of wheat, including small, plump, or badly shriveled kernels, or large pieces of broken kernels. As a general rule, the use of the fine seed sieve with round perforations one-twelfth inch in diameter, together with the

scalper sieve or the "wild-oat kicker," will be sufficient. However, if the sample contains an appreciable quantity of wild buckwheat, pigeon grass, or other seeds of a similar character, or foreign material which will not pass through the "fine seed" sieve, then the "buckwheat" sieve should be used. All material passing through the "buckwheat" sieve should be considered as dockage, except that whenever the screenings removed by this sieve consist of an appreciable quantity of small shriveled kernels, the material so removed should be rescreened over the same sieve. In the rescreening the material should be carefully deposited at one edge of the sieve, then while holding the sieve at an angle of 25 or 30 degrees the sieve should be tapped lightly until all the material has passed either to the opposite edge of the sieve or through the perforations. If operated properly, the material at the opposite edge of the sieve will consist mainly of wheat, and should be classed as wheat, and not as dockage. The material which passes through the sieve will consist mainly of wild buckwheat and other weed seed, together with a small percentage of shriveled kernels and small broken pieces of wheat, and these should be classed as dockage. In exceptional cases it may be necessary to repeat the rescreening in order to arrive at an equitable determination of the percentage of dockage.

The chess sieves should not be used unless the sample in question contains an appreciable quantity of chess. As a general rule, the chess sieves should likewise not be used until after the sample has been screened,

either over the "fine seed" or the "buckwheat" sieve, as the sample may require. Whenever it is necessary to screen for chess, the "fine chess" sieve, with perforations 0.064 by $\frac{3}{8}$ inch, should be used, except when the sample consists of wheat of large kernels mixed with large chess seeds. Large chess seeds in a sample of wheat consisting mainly of small kernels of wheat from which the chess cannot be separated readily should be considered as foreign material other than dockage and the sample handled and graded accordingly.

Whenever the "chess sieves" are used and the screenings consist of an appreciable quantity of small, shriveled, or split kernels, the material so removed should be re-screened over the same sieve, being manipulated as described for rescreening over the buckwheat sieve. In rescreening over the chess sieve the material should flow with and not across the slots.

The scalper sieve is to be used for removing coarse foreign material. Any threshed wheat kernels that remain on the scalper sieve should be picked out and returned to the wheat, and should not be considered as dockage.

The dockage will, therefore, be represented by the coarse foreign material, in addition to the finer screenings obtained by hand sieving.

Since any foreign matter remaining in the wheat after the removal of dockage is considered as "foreign material other than dockage," in which capacity it directly affects the grade, great care should be used in sieving the samples.

TEST WEIGHT PER BUSHEL

TEST WEIGHT TO BE DETERMINED ON DOCKAGE FREE WHEAT

The official standards for wheat provide that the determination of the test weight per bushel shall be made upon the basis of the grain from which the dockage has been removed. (See section 2 in the official wheat standards, defining the "basis of determinations.") The test weight per bushel is one of the main factors in determining the grade of grain and a sufficient quantity of the original sample should be freed from dockage to permit the test weight to be made with a quart tester. Under average conditions a sample of 1,000 grams of wheat containing the dockage give a sufficient amount of dockage free wheat for determining the test weight with a quart tester. However, if the wheat contains a large amount of coarse material and other foreign matter it will sometimes be necessary to remove the dockage from more than 1,000 grams in order to secure a sufficient quantity of dockage free wheat to make the test weight with a quart tester.

STANDARD METHOD OF MAKING THE TEST

The conditions given in the method described below have been found to be essential in making uniform tests of weight per bushel and obtaining accurate results, and have been adopted as standard in connection

with the enforcement of the United States grain standards Act:

- (1) Have an accurate grain tester.
- (2) Fill the test kettle from a hopper—
 - (a) having an opening $1\frac{1}{4}$ inches in diameter at its base.
 - (b) firmly supported two inches above the test kettle.
- (3) Have the test kettle rest on a firm base.
- (4) Fill the kettle each time with the same amount of overflow.
- (5) Strike the excess grain from the top of the overflowing kettle in a uniform manner with three zigzag motions with the sides of the special stoker held vertically, avoiding meanwhile any jarring of the contents.
- (6) Make the weighings on a beam accurately graduated to read in fractions of a pound.

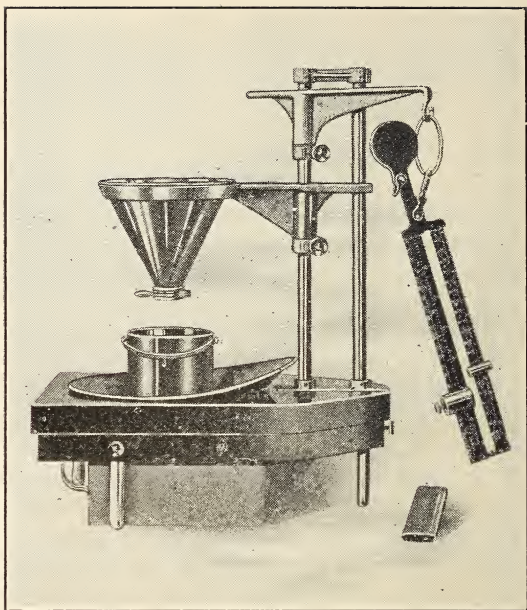


FIG. 6.—Weight per bushel tester. Official test weight per bushel apparatus, showing the funnel for filling the test kettle in a uniform manner, the special beam, and the special stoker for striking the excess grain from the top of the test kettle.

Note.—The quart tester shown in Figure 6 and described in Department of Agriculture Bulletin No. 472 has been adopted as the official tester, and is being used by the Department of Agriculture in connection with the enforcement of the United States grain standards Act. (The special stoker should be of hard wood, $\frac{3}{8}$ of an inch thick, $1\frac{3}{4}$ inches broad, and 12 inches long, each edge being a perfect half-circle.)

FOREIGN MATERIAL AND CRACKED CORN

"Foreign material and cracked corn," as provided for in section 6 of the official corn standards, includes the material that will pass through a sieve with round holes $1\frac{1}{64}$ inch in diameter, and in addition any coarse foreign matter which remains on the sieve. Figure 7 illustrates a section of the sieve and shows the arrangement of the perforations and the proportionate distance between the perforations.

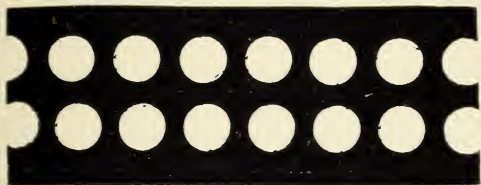


FIG. 7.—Showing section of the official corn sieve for determining the factor "Foreign material and cracked corn."

APPARATUS FOR GRADING WHEAT AND SHELLED CORN ACCORDING TO THE OFFICIAL GRAIN STANDARDS

For the information of persons who desire to equip laboratories for the grading of wheat and shelled corn according to the official grain standards of the United States, the following equipment is regarded as essential:

1. Brown-Duvel moisture tester, completely equipped with flasks, certified centigrade thermometers to read correctly from 170 degrees to 195 degrees; graduates of 25 c. c. capacity; one-hole rubber stoppers, sizes No. 5 and No. 3; condenser tubes; 150 c. c. oil measuring device; supply of oil, etc. (See United States Department of Agriculture, Bureau of Plant Industry, Circular No. 72.)

2. Balance, capacity at least 500 grams, sensitive to one-tenth gram, with set of weights, 1 gram to 500 grams.

3. Balance, capacity approximately 50 grams, graduated beam to read 1 gram and fractions of a gram, sensitive to one-tenth gram, with set of weights 1 gram to 50 grams.

4. Set of perforated metal hand sieves for use in the determination of dockage in wheat. For specifications of the "dockage" sieves see "Equipment for Separating Dockage in Wheat," page 32.

5. A small wheat tester or device for removing barley, oats, wild oats, pieces of

straw, weed stems, and other coarse matter from wheat, popularly designated as the "wild-oat kicker." For further reference see "Equipment for Separating Dockage in Wheat," page 32.

6. Sieve and pan for use in the determination of "foreign material and cracked corn" in corn:

(a) Bottom pan: Inside diameter should be thirteen and one-eighth inches; depth two and one-half inches and roll at top of pan three-sixteenths inch in diameter.

(b) Corn sieve: With round perforations $1\frac{1}{64}$ inch in diameter. This sieve should be made to nest very freely with the bottom pan.

7. Weight per bushel tester (grain tester), 1 quart capacity, with funnel having an outlet opening $1\frac{1}{4}$ inches in diameter, opening held in place 2 inches above the test kettle and a hard wood stick three-eighths inch thick by $1\frac{3}{4}$ inches broad and 12 inches long, with long edges rounded to a semicircle, for stroking the grain from the overflow test kettle. (This apparatus is fully described in United States Department of Agriculture Bulletin No. 472.)

8. A device for correctly dividing a grain sample into smaller portions for analysis and moisture determinations. (See United States Department of Agriculture Bulletin No. 287.)

9. Grain trier (grain probe), 60 inches long. The trier should be double shelled and divided into compartments.

10. Sampling canvas, 5 feet by 2 feet in dimensions, on which to empty the grain from the trier.

11. Air-tight containers (sample cans), capacity approximately 450 grams.

12. Cloth sample bags, capacity at least 2 quarts.

13. Grain pans, with spout for pouring into other containers.

In addition to the apparatus listed above, the following equipment will be found convenient and desirable:

1. Extra moisture testing equipment: flasks, thermometers, graduates, rubber stoppers, test tube cleaners, etc.

2. Five gallon oil can equipped with faucet.

3. Five gallon oil can equipped with strainer funnel to recover oil.

4. Five gallon refuse can.

5. Small funnel to fit in moisture flasks for pouring sample into the flasks.

6. Tweezers for mechanical analysis.

7. Small grain scoop.

8. Brush for cleaning up grain and grain dust.

9. Heavy table for handling samples, analysis, etc.

10. Furniture, including chairs, stationery supplies, files, etc., to keep proper records.

APPEALS AND DISPUTES UNDER THE UNITED STATES GRAIN STANDARDS ACT

The United States grain standards Act provides, in part, as follows:

APPEALS

“That whenever standards shall have been fixed and established under this Act for any grain and any quantity of such grain sold, offered for sale, or consigned for sale, or which has been shipped, or delivered for shipment in interstate or foreign commerce shall have been inspected and a dispute arises as to whether the grade as determined by such inspection of any such grain in fact conforms to the standard of the specified grade, any interested party may, either with or without reinspection, appeal the question to the Secretary of Agriculture, and the Secretary of Agriculture is authorized to cause such investigation to be made and such tests to be applied as he may deem necessary and to determine the true grade: Provided, That any appeal from such inspecting and grading to the Secretary of Agriculture shall be taken before the grain leaves the place where the inspection appealed from was made and before the identity of the grain has been lost, under such rules and regulations as the Secretary of Agriculture shall prescribe.”

DISPUTES

“That any * * * grain sold, offered for sale, or consigned for sale by any of the grades fixed therefor in the official grain standards may, upon compliance with the rules and regulations prescribed by the Secretary of Agriculture, be shipped in interstate or foreign commerce without inspection from a place at which there is no inspector licensed under this Act to a place at which there is no such inspector, subject to the right of either party to the transaction to refer any dispute as to the grade of the grain to the Secretary of Agriculture, who may determine the true grade thereof.”

FEES AND CHARGES

“Whenever an appeal shall be taken or a dispute referred to the Secretary of Agriculture under this Act, he shall charge and assess and cause to be collected, a reasonable fee, in amount to be fixed by him, which fee, in case of an appeal, shall be refunded if the appeal is sustained. All such fees, not so refunded, shall be deposited and covered into the Treasury as miscellaneous receipts.”

SECRETARY'S FINDINGS

“The findings of the Secretary of Agriculture as to grade, signed by him or by such officer or officers, agent or agents, of the Department of Agriculture, as he may designate, made after the parties in interest have

had opportunity to be heard, shall be accepted in the courts of the United States as prima facie evidence of the true grade of the grain determined by him at the time and place specified in the findings."

HOW TO FILE AN APPEAL OR DISPUTE

Appeals are taken and disputes are referred to the Secretary of Agriculture by filing either a complaint or stipulation in the proper office of Federal Grain Supervision. A complaint or stipulation may be filed in writing or by telegraph. The proper form for the complaint or stipulation and all other regulations of the Secretary of Agriculture under the United States grain standards Act are given in United States Department of Agriculture, Office of the Secretary, Circular No. 70. For further information regarding the filing of a complaint or stipulation, or regarding the United States grain standards Act, or the regulations of the Secretary of Agriculture thereunder, apply to any Office of Federal Grain Supervision or to the Chief of the Bureau of Markets, Department of Agriculture, Washington, D. C.

